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ABSTRACT

The Children of the Future project is a 3-year (1990-1993) study of the attitudes towards and experiences with computers of nearly 200 children between 7 and 12 years of age at 13 leisure centers, or after-school day care centers, throughout Sweden. The major aims of the project are to: (1) develop an educational method to help children work better with computers; (2) build an infrastructure between children and educators based upon computer communication and electronic mail; (3) develop children's social competence; (4) promote equal opportunities for boys and girls, and for children from lower and upper social classes; and (5) increase educators' knowledge about computers as an educational tool. Children responded to two questionnaires, one at the beginning and one at the end of the school year, about their family's socioeconomic status and their interaction with computers and other electronic technology. Results indicated that, although children from lower-class backgrounds had more access to cable television, video cassette recorders, and television game systems than did children from upper-class backgrounds, children from upper-class backgrounds were twice as likely as children from lower-class background to have access to a computer at home. It was also found that girls had a somewhat higher interest in computers, and used them more often, than boys did. (MDM)

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Summary

The R&D project "Children of the Future" is a three-year project about children in Sweden who are enrolled at a "children´s leisure center" - an institution for play and care out of school hours. The age of the children is between 7 and12, but most of the children (75%) are 7-9 years old. The project comprises 13 centers with about 15 children in each center. The children work together with computers and produce newspapers and databases. They work with programs for word processing, graphics, databases, desk-top and electronic mail.

In Sweden it is more common for boys to have a computer at home for work and play than it is for girls. It is also more common for children from the middle and upper social classes to have a computer at home. One of the aims of this project is to develop an educational method for work with children and computers in the information society, and a way to promote equal opportunity between girls and boys and also between children from lower and upper social classes.

Using a questionnaire, we have asked all the children included in the project a large number of questions about computers, their interest in computers and so on. We have asked these questions at the beginning of the project and again after one year. We have collected data from the journals kept by each group. In the journals we have data on all computer work, how much time they have spent with the computers etc.

The working methods and results of the research are presented in the paper. One of the most interesting data is that the girls are more interested in computers in the project, and that they also use the computers more than the boys do.

Background

As a College of Education lecturer in social sciences, teaching pre-school teachers, recreation instructors and primary school teachers I have observed that knowledge of and insight into society, its changes and its influence on our departments of education are of great importance as a means of creating a teaching enviroment preparing children and young people for "the real world".

The computer society

The computer age is here and there are many signs that social development has reached a period of change. But the changes can either increase or reduce the influence of a certain group. We know that it is mainly routine jobs that disappear in connection with computerization of an operation. This means that the woman´s labour market, today already only a part of that available to men, will become even more limited. Computerization reinforces the prevailing structure - this means that an undemocratic system becomes more undemocratic with computerized routines and a democratic system becomes - or has the necessary requirements for becoming - more democratic.

It is essential that those of us working in the educational sector of the community should involve ourselves in what we wish developments to look like both for ourselves, and with an eye to the future, for the children and young people with whom we work. For this reason we must obtain more knowledge about computerization in the community and its consequences for children and young people.

Child care in Sweden

Sweden with a population of about 8.5 million people and a workforce of approximately 4 m ·ion, has a well developed social service system. Many woman work outside the home; abc 86% of all woman with children under 10 years old are working outside the home. This means that the child care service has been extended over a period of many years; today we have several types of child care, of which day nurseries, family day nurseries and part-time pre-schools are the dominant forms.

But, in contrast with many countries, children when they start at school (until now) at the age of seven have they, opportunity to continue in school-age-child-care at "children´s leisure centers". Thes leisure centers are the most common form of after-school care for school children. These centers are meant for 7-12 year old children. 42% of the children between 7 and

9 years old and around 6% of the children between 10-12 years old participate in the programme.

A typical "children´s leisure center" in Sweden is open from 6.30 am to 6.30 pm. The centers are also open during the school holidays. They can be attached to a compulsory school or in a separate building. There are about 18-20 children in the group and there is a staff of 2 persons. One of them normally has 2.5 year vocational training specially designed for "children´s leisure center". It is a university programme leading to an examination called "University Certificate in Recreation and Leisure Education".

The parents work and study outside the home and the children need somewhere and someone to go to. And the parents need to feel secure that their children are in good hands. That leads us to the state of basic school-age child-care, being: Somewhere to go, something to do, something to eat and someone to meet.

The National Board of Health and Welfare has published a general programme, a curriculum, called "Educational programme for leisure centers" where they identify goals, tasks and principles for the "children´s leisure center".

One of the aspects stressed in this educational programme is the importance of giving the children knowledge of their immediate neighbourhood and allowing them to develop social competence. Another aspect is that the children´s leisure center must make it easier for children to understand and to work with video, TV, computers and information technology.

Computers in education

Swedish children start school when they are 7. The compulsory school is 9 years divided into three levels. The first three years is the junior level, next three years are the intermediate level and the last three year is the upper level of compulsory school. During the upper level the children should have about 80 lessons of computer science. For example 80 lessons for one of the years or 26-27 lessons for each of the three years.

The National Board of Education has run a number of development projects. They have been running 154 projects for the period of 1988-1991, and 130 of them have been evaluated. 53 projects were at upper secondary school, 44 project at upper level, 10 projects at intermediate level, 20 project at intermediate and junior level and 1 project at junior level.

The project "Children of the Future" - Aims

The aims of this project is:

to develop an educational method for work with children and computers in the information society

to bulid an infrastructure between children and between educators, an infrastructure based upon computer communication and electronic mail

to develope children´s social competence

to promote equal opportunity between girls and boys

to promote equality between children from lower and upper social classes

to increase our knowledge about computer as a educational aid

Methods and activity in "Children of the Future"

"Children of the Future" is a three-year project (1990-1993) and the children are between 7 and12, but most of them (75%) are 7-9 years old. The project comprises 13 centers with about 15 children at each center. The centers are located in the south, in the middle and in the northern part of Sweden. It is over 1,000 kilometres between two of the centers. They have one computer complete with harddisc, printer, software and modems at each center. They work with programs for word processing, graphics, databases, desk-top and electronic mail. They do not have any "educational software", software products for children or computer games.

The children work together with computers and produce newspapers and databases. They work with the immediate environment as a theme for their activities. This means that the children have done interviews and investigations in the area and the results have been sent to all the other centers by electronic mail and compiled into a magazine. The children have also produced a database about their own intrests and when the databases are ready they use our computer network to send it to every other center in the project. With these 13 different databases the children produce one big database. The children use the databases to find new interests, new friends and pen-friends.

Our point of departure has been that the activity should function at an ordinary leisure center where the recreation instructors themselves had no experience of computers before the project started. The staff have taken part in a short course of training to use the computer program they work with. They have had one day before the project started and two days more after three weeks. That is all. All the time the recreation instructors themselves have been in charge of the activities together with the children.

All the educators involved have a two day seminar every term. At this seminar they discuss together with the project leader the aims, plans, evaluation and results for the period.

Once a year all the children meet in a big "Children of the Future Festival". This is a festival for two days during schooltime, somewhere in Sweden. The aim is to arrange a meeting between the "computer friends" and have a lot of social activities.

The methodological approach is one that we believe may be tried out in many other educational activities with children - in junior school classes for example.

Results

Using a questionnaire, we have asked all the children included in the project a large number of questions about computers, their interest in computers and so on. We have asked these questions at the beginning of the project and again after one year. We have collected data from the journals kept by each group. In the journals we have data on all computer work, how much time they have spent with the computers etc.

The first questionnaire was answered by 173 children in 12 of the leisure centers and the second questionnaire was answered by 163 children in 13 of the leisure centers. It is a survey that included all the children in the project.

The mean value for the children´s age was 8.6 years the first time and 9.2 the second time. For the boys it was 8.8 years and 8.4 years for the girls.

Table 1 Age (first questionnaire)

Age from	Percent
6 yrs	1,2
7 yrs	20,8
8 yrs	30,1
9 yrs	23,1
10 yrs	16,2
11 yrs	5,8
12 yrs	2,3
13 yrs	0,6

In the first questionnaire 52% (90) were boys and 48% (83) girls and the second time there were 51,5% boys and 48,5% girls

The results have been analysed related to gender and social classes. The social classes have been defined by a method composed by Statistics Sweden and called Swedish Socioeconomic Classification. The classification is based primarily on the labour force and on occupation. If you know a person´s occupation, you can look in a booklet from Statistics Sweden and get a number. That number relates to a level of the occupation. One usual form is a classification into six groups.

Table 2	Socioeconomic classification		
Code	Explanation	Number	Percent
11-12	Unskilled workers	46	27,1
21-22	Skilled workers	26	15,3
33-36	Assistant non-manual employees	25	14,7
44-46	Intermediate non-manual employees	42	24,7
54-60	Employed and self-employed professional, higher civil servants and executives	21	12,4
76-87	Self-employed	10	5,9

We have included unskilled workers, skilled workers and assistant non-manual employees in one group and called them "lower social classes" and the next three groups, intermediate non-manual employees, employed and self-employed professional, higher civil servants and executives and self-employed we called "upper social classes". In the first questionnaire there were 48 boys and 49 girls in the "lower social classes" and 41 boys and 32 girls in the "upper social classes"

In the next table can we see that social class and housing correlate.

Table 3	Housing and social class			
	Workers	Non-manual emloyees	Professionals, self-employed	Total
Own house	23,6%	55,2%	71%	44,7%
Apartment	76,4%	44,8%	29%	55,3%

Ownership of video machine, cable-TV and computer games/TV-games

75,7% of the children have a video machine at home and 65,9% have cable-TV. If we combine that, 91% of the children have either video or cable-TV at home.

Table 4	Ownership of video machine and social class			
	Workers	Non-manual emloyees	Professionals, self-employed	Total
Access	80,6%	74,6%	67,7%	75,9%
No access	19,4%	25,4%	32,3%	24,1%

Table 5	Cable-TV och social class			
	Workers	Non-manual emloyees	Professionals, self-employed	Total
Access	76,4%	56,7%	58%	65,3%
No access	23,6%	43,3%	42%	34,7%

As the table shows video machine and cable-TV are more common in lower social classes

Table 6	TV-games och social class	
	Lower social classes	Upper social classes
Access	37,1%	26%
No access	62,9%	74%

Tabell 7	TV-games and gender	
	Boys	Girls
Access	42,2%	22%
No access	57,8%	78%

Tables 6-7 shown that TV-games are more common in lower social classes and in the boys´ homes.

Tabell 8	TV-games in relation to gender and social class.			
	"Lower class boys"	"Upper class" boys"	"Lower class girls"	"Upper class girls"
Access	50%	34,1%	24,5%	15,6%
No access	50%	65,6%	75,5%	84,4%

Table 8 shown that 50% of the lower class boys have access to TV-games but only one of seven upper class girls has access to them.

In the first questionnaire 24,9% (43) of the children have access to a computer at home. If we look at the leisure centers there is a difference between 5,6% to 53,3% of the children who have a computer at home.

Table 9	A computer at home and social class			
	Workers	Non-manual emloyees	Professionals, self-employed	Sum
Access	19,4%	20,9%	48,4%	25,3%
No access	80,1%	79,1%	51,6%	74,7%
	Lower social classes		Upper social classes	
Access	21,2%		30,1%	
No access	78,4%		69,9%	

The table shows that it is more common to have a computer in upper social class homes. Ownership of computers is different from video machines, cable-TV and TV-games.

15.7% of the girls had a computer at home and 33.3% of the boys. More than twice as many boys as girls.

Table 10	A computer at home and social class and gender			
	"Lower class boys"	"Upper class" boys"	"Lower class girls"	"Upper class girls"
Access	35,4%	31,7%	8,2%	28,1%
No access	64,6%	68,3%	91,8%	71,2%

We also asked the children which member of the family is the owner of the computer. The answere to this is given in table 11. More than half of the boys own the computer but none of the girls.

Table 11	The owner of the computer and gender		
	Boys	Girls	Sum
Myself	55,2%	0%	39%
Father	27,6%	58%	36,6%
Mother	3,5%	0%	2,4%
Brother	3,45%	16,7%	7,3%
Sister	0%	0%	0%
Relative	0%	8,3%	2,4%
"Everybody"	10,3%	16,7%	12,2%

Knowledge of and attitudes to computers and use of computers

91.3% of the children know what a computer is in the first questionnaire (in autumn) and 98.2% in the second questionnaire (in spring). The question was: Do you know what a computer is?

Table 12 Knowledge of computer and social class

	Lower class (a)	Lower class (s)	Upper class (a)	Upper class (s)
Yes	89,7%	96,8%	93%	100%
No	10,3%	3,2%	6,7%	0%

Table 13 Knowledge of computer and gender

	Boys (a)	Boys (s)	Girls (a)	Girls (s)
Yes	93,3%	98,8%	89,2%	97,5%
No	6,7%	1,2%	10,8%	2,5%

Table 14 Knowledge of computer and social class and gender

	Low.cl.boy (a)	Low.cl.boy (s)	Upp.cl.boy (a)	Upp.cl.boy (s)
Yes	91,7%	97,8%	95,12	100%
No	8,3%	2,2%	4,9%	0%
	Low.cl.girl (a)	**Low.cl.girl (s)**	**Upp.cl.girl (a)**	**Upp.cl.girl (s)**
Yes	73,5%	95,8%	75%	100%
No	26,5%	4,2%	25%	0%

Table 14 shows that the big differences before the the project started are nearly eliminated after one year.

84.4% of the children have used a computer sometimes, 90.4% of the upper social classes and 80.4% of the lower social classes. And 89.9% of the boys and 82% of the girls had used a computer before the project.

Table 15 "Is it fun to use a computer?" and social class

	Lower class (a)	Lower class (s)	Upper class (a)	Upper class (s)
Yes	95,7%	96,8%	100%	96,9%
No	4,3%	3,2%	0%	3,1%

Table 16	"Is it fun to use a computer?" and gender			
	Boys (a)	Boys (s)	Girls (a)	Girls (s)
Yes	96,6%	96,4%	98,8%	96,2%
No	3,5%	3,6%	1,2%	3,8%

Table 17	"Is it fun to use a computer?" and gender and social class			
	Low.cl.boy (a)	Low.cl.boy (s)	Upp.cl.boy (a)	Upp.cl.boy (s)
Yes	93,3%	97,8%	100%	94,3%
No	6,7%	2,2%	0%	5,7%
	Low.cl.girl (a)	Low.cl.girl (s)	Upp.cl.girl (a)	Upp.cl.girl (s)
Yes	97,9%	95,8%	100%	100%
No	2,1%	4,2%	0%	0%

Tables 15-17 show that the interest for computer work remains after one year with the project. The girls like the computer as much as the the boys do. Lower class boys interest increases by about 4% and that of the upper class boys is reduced by 6%.

Table 18	"Is it difficult to use a computer?"	
	Autumn questionnaire	Spring questionnaire
Yes	28,1%	8%
No	71,9%	92%

Table 19	"Is it difficult to use a computer?" and social class			
	Lower class (a)	Lower class (s)	Upper class (a)	Upper class (s)
Yes	31,9%	9,47%	23,3%	6,25%
No	68,1%%	90,43%	76,7%	93,8%

Table 20	"Is it difficult to use a computer?" and gender			
	Boys (a)	Boys (s)	Girls (a)	Girls (s)
Yes	25,3%	9,5%	31,3%	6,33%
No	74,7%	90,5%	68,8%	93,7%

Table 21 "Is it difficult to use a computer?" and social class and gender

	Low.cl.boy (a)	Low.cl.boy (s)	Upp.cl.boy (a)	Upp.cl.boy (s)
Yes	28,9%	10,9%	22%	8,6%
No	71,1%	89,1%	78%	91,4%
	Low.cl.girl (a)	Low.cl.girl (s)	Upp.cl.girl (a)	Upp.cl.girl (s)
Yes	34,8%	8,3%	25%	3,45%
No	65,2%	91,7%	75%	96,6%

The table shows that the difference between children from different social classes has increased. The girls have passed the boys, after one year there are more boys than girls who consider that it is difficult to work with the computer.

We also asked the children if they want to work with computers when they have grown up and 52% in the first questionnaire and 55% in the second one want to do so.

Table 22 "Do you want to work with computers when you have grown up?" and social class.

	Lower class (a)	Lower class (s)	Upper class (a)	Upper class (s)
Yes	47,4%	51,1%	59%	63%
No	52,6%%	48,9%	41%	37,5%

Table 23 "Do you want to work with computers when you have grown up?" and gender.

	Boys (a)	Boys (s)	Girls (a)	Girls (s)
Yes	55,6%	54,8%	48,2%	55,7%
No	44,4%	45,2%	51,8%	44,4%

Table 24 "Do you want to work with computers when you have grown up?" and social class and gender.

	Low.cl.boy (a)	Low.cl.boy (s)	Upp.cl.boy (a)	Upp.cl.boy (s)
Yes	47,9%	47,8%	63,4%	62,9%
No	52,1%	52,2%	36,6%	37%
	Low.cl.girl (a)	Low.cl.girl (s)	Upp.cl.girl (a)	Upp.cl.girl (s)
Yes	46,9%	54,2%	53,1%	62,1%
No	53,1%	45,8%	46,9%	37,9%

Table 23 shows that more of the girls than of the boys want to work with computers. Table 24 shows that there is a major difference between the two questionnaires for the girls but not for the boys. I thought that there would be more boys than girls wanting to work with computers, but I was wrong.

The tables above are from questionnaires in which the children have answered the questions. The tables below give the educators´ impressions of the childrens intrests. As you can see there is a major correlation between the educators´ ideas and the children´s own answers.

Table 25 Children´s interest in computers and social class and gender

Group	Percent
Lower social classes	45,5
Upper social classes	55
Boys	46,4
Girls	52,3
Lower class boys	42
Lower class girls	49
Upper class boys	52.5
Upper class girls	5 ',6

Use of computers

During the project we have collected data in journals about the children´s use of the computer. How much they use it, if they use the computers in project work or in their free time, what programs and how many times.

For the whole year the mean value is around 3 hours in project work and 3 hours in free time work. We have analysed the group of children who use the computer more than 3 hours in the project and also the free time group.

Tabell 26 "High users" of the computers in the project	
All children	22,2%
Lower class children	22,9%
Upper class children	24,8%
Boys	17,7%
Girls	27,3%
Lower class boys	18%
Upper class boys	20%
Lower class girls	27,5%
Upper class girls	31,2%

The table shows that the girls use the computers more than the boys do.

Table 27 "High users" of the computers in the children´s free time	
All children	34,7%
Lower class children	27,7%
Upper class children	45,6%
Boys	34,4%
Girls	35,2%
Lower class boys	32%
Upper class boys	38,5%
Lower class girls	23,5%
Upper class girls	55,2%

If we compare table 27 with table 26 we can see that the children use the computer more outside the project. We can also see that upper class children make the most of the opportunity. The lower class children are a disadvantage during free time work.This also applies to the girls

Discussion

We have seen in three different ways that the girls in the project are more active and interested in computers than the boys. The next question is, why? Is it the girls´ "personality"? The girls work with the computer in a different way, they like to draw beautiful pictures and write careful

stories. The boys want to experiment much more. The girls have more social intersts. Is it that we in the Children of the Future support? If so, is it a good idea to support that ?

Is it that the female educators have set a very good example for the girls?

Is it that the Children of the Future project has had a design with planned activities, decided things to do, an idea that everybody should work with the project, use of graphics and word processing programs and the use of computers for communication?

Or is it because that the girls have "at last" had the opportunity to use the computer in a way equal to the boys. And because the girls have more access to the computer they also increase their interest?

We plan to follow up our survey with a series of interviews focusing on the causes of the girls´ interest. But is it equality for around 200 children in the "Children of the Future" to have access to computers and a very good level of activity, when most of children between 7 and 12, there are about 600,000 in Sweden, have no access at all?